CLAIMS

1. An electronic metal detector having
a transmit coil adapted to transmit an alternating magnetic field associated with a reactive transmit voltage,
transmit electronics adapted to generate a transmit voltage signal which is applied to the transmit coil,
receive electronics adapted to receive a magnetic field signal and process received signals to produce an indicator output,
wherein the transmit voltage signal is selected such that the reactive transmit voltage is approximately constant for at least a time period during which a magnetic field signal to be processed is received by the receive electronics.

2. An electronic metal detector as in claim 1wherein the transmit electronics includes a linear amplifier and switching voltage electronics, the switching voltage electronics being adapted such that the transmit voltage signal includes a switched voltage component including periods of at least two different switched voltages, a first switched voltage during a first period, and second switched voltage during a second period,
the linear amplifier being adapted such that the transmit voltage signal includes a component which changes approximately linearly in time during a third period which is within the said first period,
the receive electronics receiving during at least a period during the third period,
wherein the transmit voltage signal is selected such that the reactive transmit voltage is approximately constant during the third period for a selected range of transmit coil effective inductive component impedance.

3. An electronic metal detector as in claim 2 wherein said switched voltage component includes a sequence of switched voltage periods selected such that Fourier components of this sequence contain at least two frequencies of substantial magnitude, the receive electronics being adapted to be responsive and to receive signals for processing at least the said at least two frequencies, further characterised in that a ratio of reactive transmit voltages at each of the said at least two frequencies is substantially constant for the said selected range of transmit coil effective inductive component impedance.

4. An electronic metal detector as in claim 3 further characterised in that the reactive transmit voltage is approximately zero during the third period.

5. An electronic metal detector as in any one of the preceding claims wherein the transmit electronics is adapted to effect an effective negative resistance which is selected to be approximately equal in magnitude but opposite to the resistance of the effective resistive component impedance met by the transmit voltage signal, the negative effective resistance being in series with the transmit coil.

6. An electronic metal detector as in any one of the preceding claims wherein the transmit electronics is adapted to effect a ramp voltage which is approximately proportional to the integral of the switched voltage component.

7. An electronic metal detector as in any one of the preceding claims wherein the transmit electronics is adapted to effect a ramp current which is approximately proportional to the integral of the switched voltage component.

8. An electronic metal detector as in claim 8 wherein the said switching voltage electronics includes power supply storage capacitors and wherein the forward transfer gain of the ramp voltage is controlled by a servo-loop which is adapted to maintain low constant current flow to the switching voltage electronics, the storage capacitors being adapted to store charge, some of which charge will flow back and forth through the switching voltage electronics and transmit coil.

9. A method of detection of metal for use in environments of varying magnetic permeability, including generation of a search signal wherein a ratio of reactive transmit voltages at each of at least two frequencies is substantially constant for a selected range of transmit coil effective inductive component impedance.

10. A method of detection of metal as in claim 9 wherein the search signal is selected such that the reactive transmit voltage is approximately constant for at least a time period during which a magnetic field signal returned from a search environment is being received.

11. A method of detection of metal for use in environments of varying magnetic permeability, including the use of an electronic metal detector as claimed in any one of claims 1-8.

12. An electronic metal detector substantially as described in the specification with reference to and as illustrated by any one or more of the accompanying drawings.

13. A method of detection of metal for use in environments of varying magnetic permeability, substantially as described in the specification with reference to and as illustrated by any one or more of the accompanying drawings.